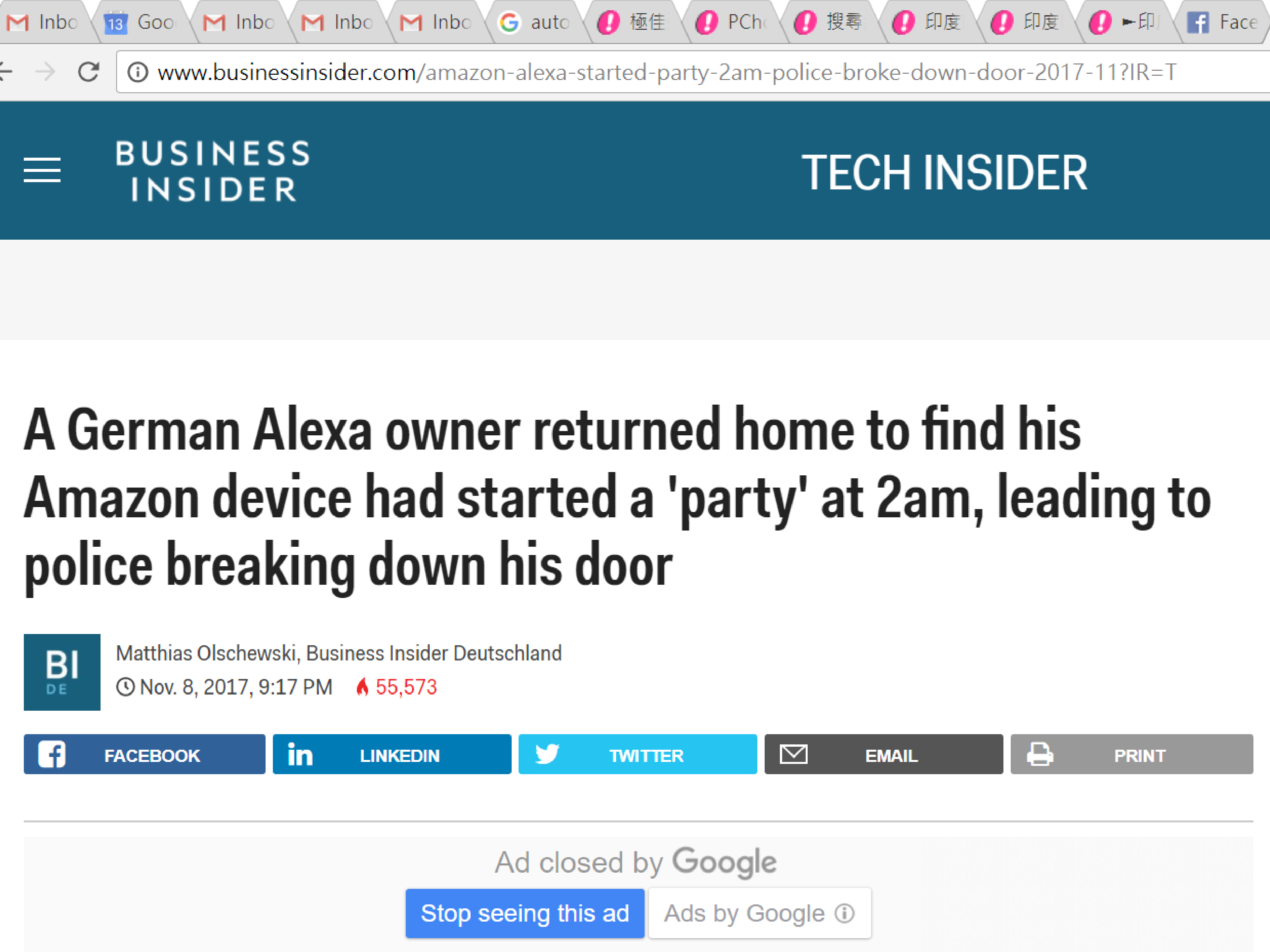
Cyber Security Landscape in Taiwan

www.twnic.net.tw

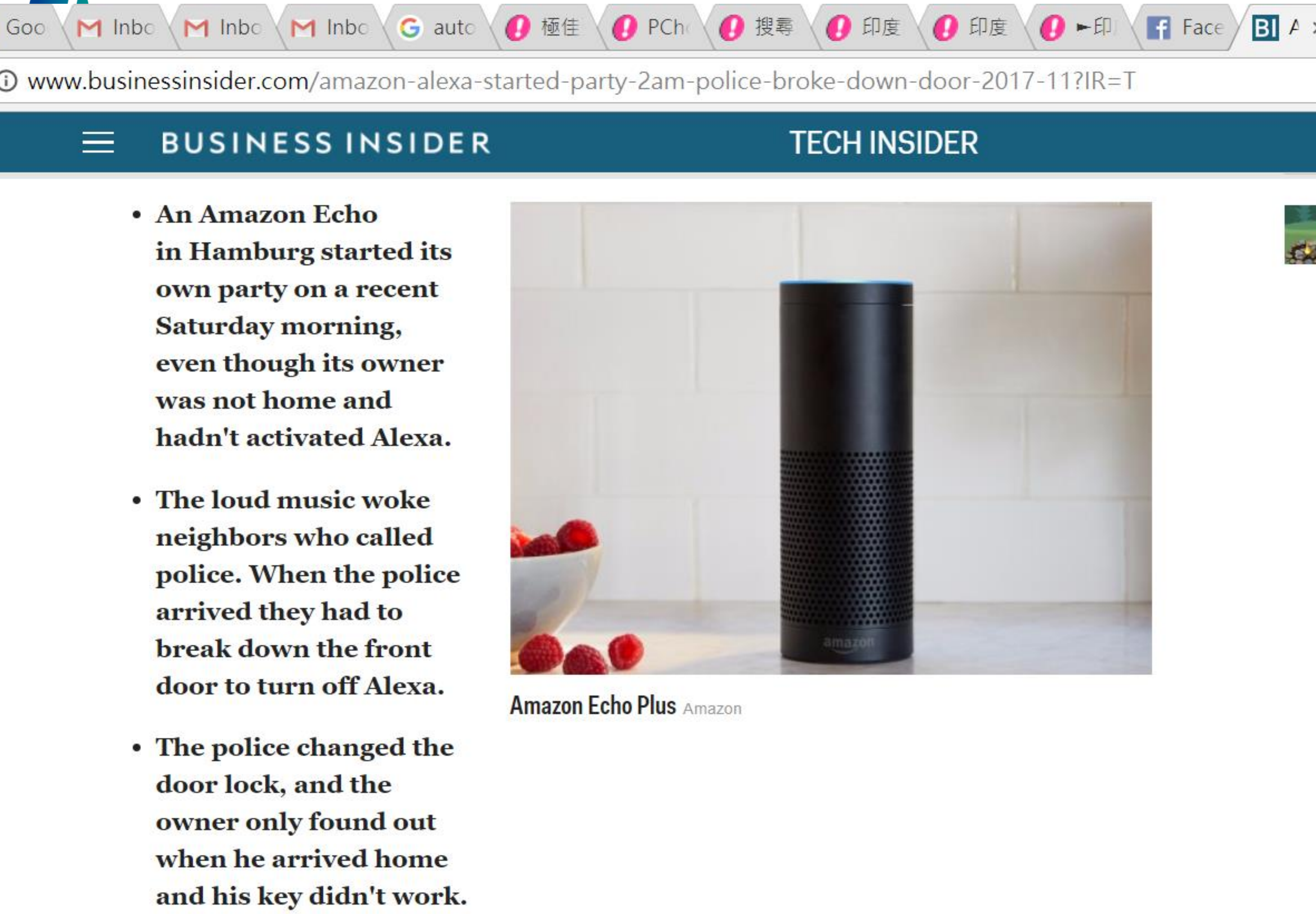
Joy Chan
TWCERT/CC
26 November, 2018


Inbo
Goo
Inbo
Inbo
Inbo
auto
極佳
PCh
搜尋
印度
印度
►印
Face
www.businessinsider.com/amazon-alexa-started-party-2am-police-broke-down-door-2017-11?IR=T
BUSINESS INSIDER
TECH INSIDER

A German Alexa owner returned home to find his Amazon device had started a 'party' at 2am, leading to police breaking down his door

Matthias Olschewski, Business Insider Deutschland

Nov. 8, 2017, 9:17 PM 55,573



www.businessinsider.com/amazon-alexa-started-party-2am-police-broke-down-door-2017-11?IR=T

BUSINESS INSIDER

TECH INSIDER

- An Amazon Echo in Hamburg started its own party on a recent Saturday morning, even though its owner was not home and hadn't activated Alexa.
- The loud music woke neighbors who called police. When the police arrived they had to break down the front door to turn off Alexa.
- The police changed the door lock, and the owner only found out when he arrived home and his key didn't work.

Amazon Echo Plus Amazon

New ICT,
New Challenges

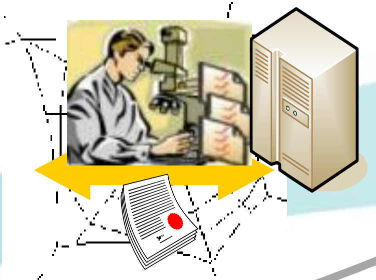
The impact is even bigger

- Boundary deconstruction, 3G/4G/5G
- Cloud Service, Smart IoT
- Cyber Physical Integration

Inter-networking Security

Anti-spam Mail
VA, F/W, IDS, IPS
PKI, VPN

Web Service Security



Web App Firewall
Web DB Security Monitor
SIEM/Taint Analyzer
DRM

Cloud & Data Security

Cloud Security
Data Security
Security Governance
Privacy Preserving
Mobile Security..

Ubiquitous / IoT Security

M2M Security
Cyber Physical Security
Context Aware Threat Detection
ICS Cybersecurity ..

Smart Living **Smart City**

Critical infra **Healthcare**

2004 2008 2012 2016 2018

Hacker’s attack & disaster expanded

showoff -> steal data -> damage -> economic crime
-> political purpose

2013 3/20
DarkSeoul cyber attack on South Korea

2013 5/24
Electronic document system was intrusion, Taiwan

2013 12/19
US Target was hacked by 18 m, 110 million confidential data was stolen, loss 420 million US dollars

2013 12/31
Oil, power and water plants were attacked 257 times, USA

2014 2/6
Taiwan 18 shopping site leak personal information, consumers are deceiving NT 90 million

2014 2/24
ec-council website was hacked, user sensitive be leaked

2014 12/15
The German steer mill control system was compromised, leaving the furnace out of controlled and unrecoverable damage

2014 12/22
Cool mobile phones, router & computers which made by China have been found the back door of a Trojan horse

2015 12/28
"Ransomware rages on Taiwan" the most appalling security attack of the year

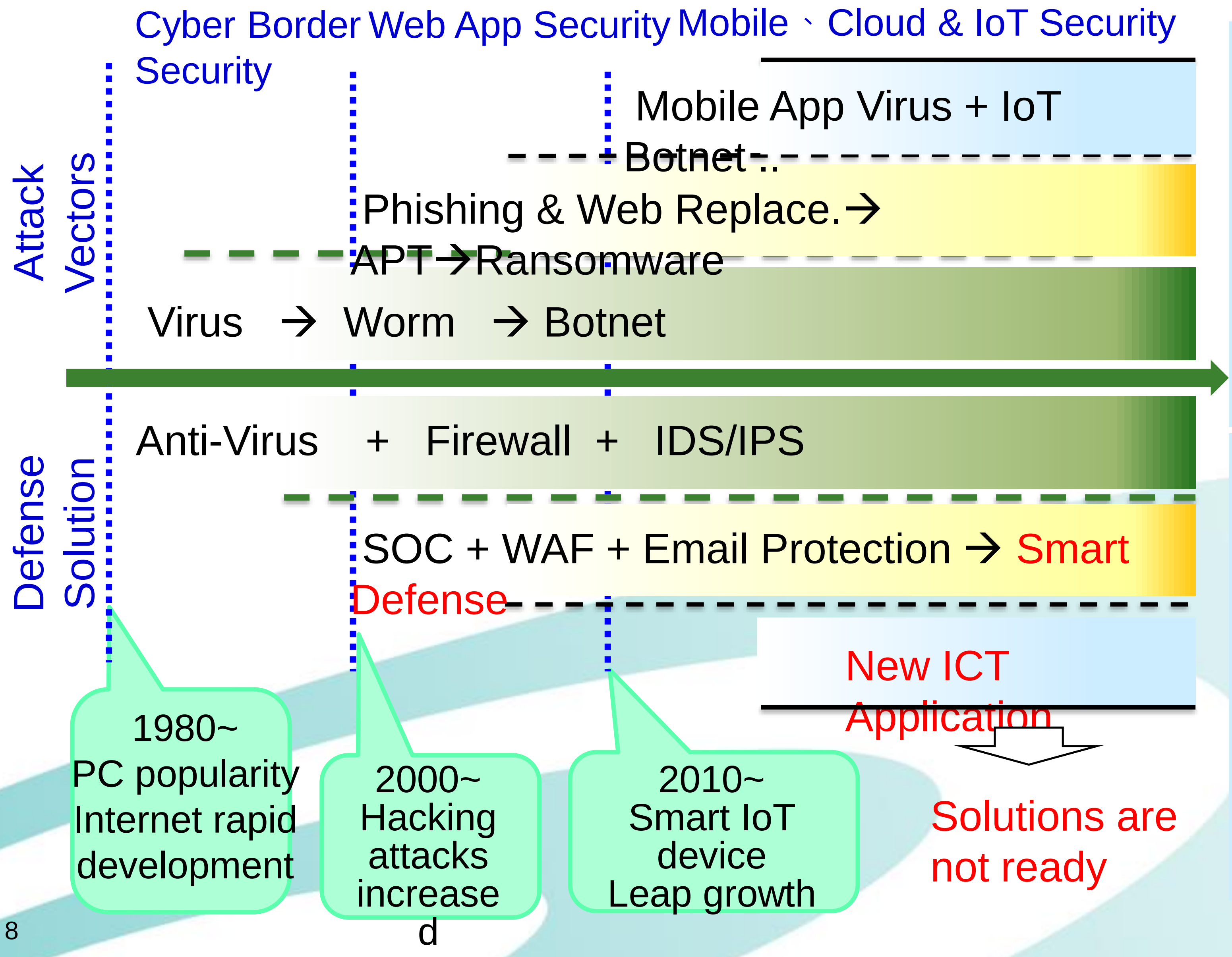
2016 2/5
Hackers invaded Bank of Bangladesh's TELEX transfer system and stole $ 81 million

2016 7/10
First Bank’s ATM was hacked, NT 83.3 million was picked up by theft without card

2016 10/21
Millions of IoT devices DoS attack Amazon, Twitter

2017 10/3
Far Eastern Bank SWIFT was hacked, stolen NT 1.8 billion

Security Solutions vs New Threats



Cyber Border Security

Web App Security

Mobile 、Cloud & IoT Security

Attack Vectors

Mobile App Virus + IoT Botnet ..

Phishing & Web Replace.→ APT→Ransomware

Virus → Worm → Botnet

Defense Solution

Anti-Virus + Firewall + IDS/IPS

SOC + WAF + Email Protection → Smart Defense

New ICT Application

Solutions are not ready

1980~ PC popularity Internet rapid development

2000~ Hacking attacks increased

2010~ Smart IoT device Leap growth

Increasingly sophisticated attacking techniques

Emerging ICT technologies change the vector of attacks

Traditional defense efficiency is difficult to upgrade

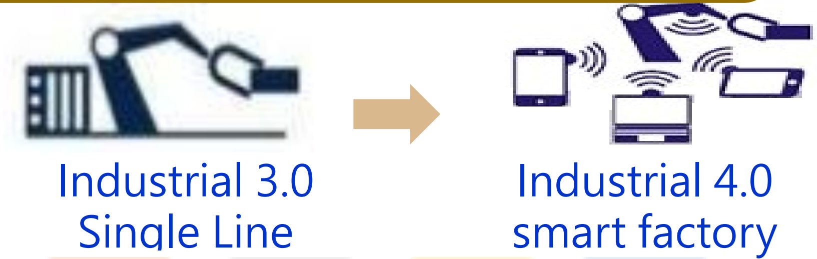
Lack effective defensive techniques to face emerging attacks

Challenges for New Digital Era

1. IoT applications inadequate security, affecting business, facilities and personal safety

- Industry 3.0-> 4.0，ICS Cyber Physical System (CPS) connection->Exposure of security vulnerabilities

- Bank 2.0-> 3.0，Diverse payment devices and transaction flow -> Counterfeit, identity theft risk of derivative transactions



階段1
網際網路和社群媒體
主控權、多元選擇
階段2
「螢幕」和智慧型手機
隨時、隨地
階段3
行動錢包
無卡、無現金
階段4
人人是銀行
BANK
普及、無所不在

資料來源：BRETT KING(2013)，BANK3.0—銀行轉型未來式。

2. Cloud services have privacy and security concerns

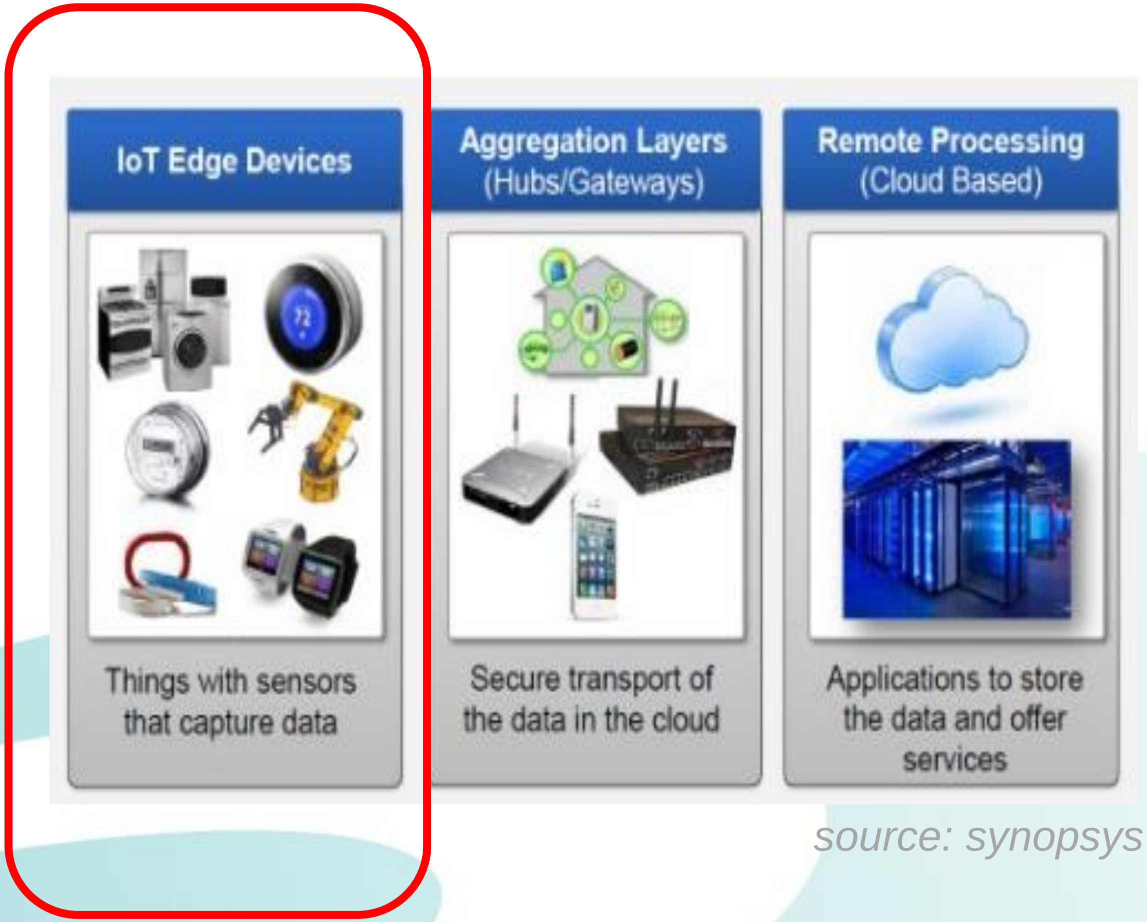
- Enterprises rely on Google Drive, Dropbox and other services, more sensitive information leaks, malware quickly infected
- Data open to the public, privacy leak doubts

3. Smart mobile and apps hidden security risks

- Android OS, Apps and wireless comm. vulnerability causing confidential losses
- Mobile devices may have malicious software or backdoor vulnerabilities

IoT devices are easily hack

- 7 x 24 hours continue operation
- Most without anti-virus mechanism
- Default or simple login password
- More internet services open



IoT Edge Devices

Things with sensors that capture data

Aggregation Layers (Hubs/Gateways)

Secure transport of the data in the cloud

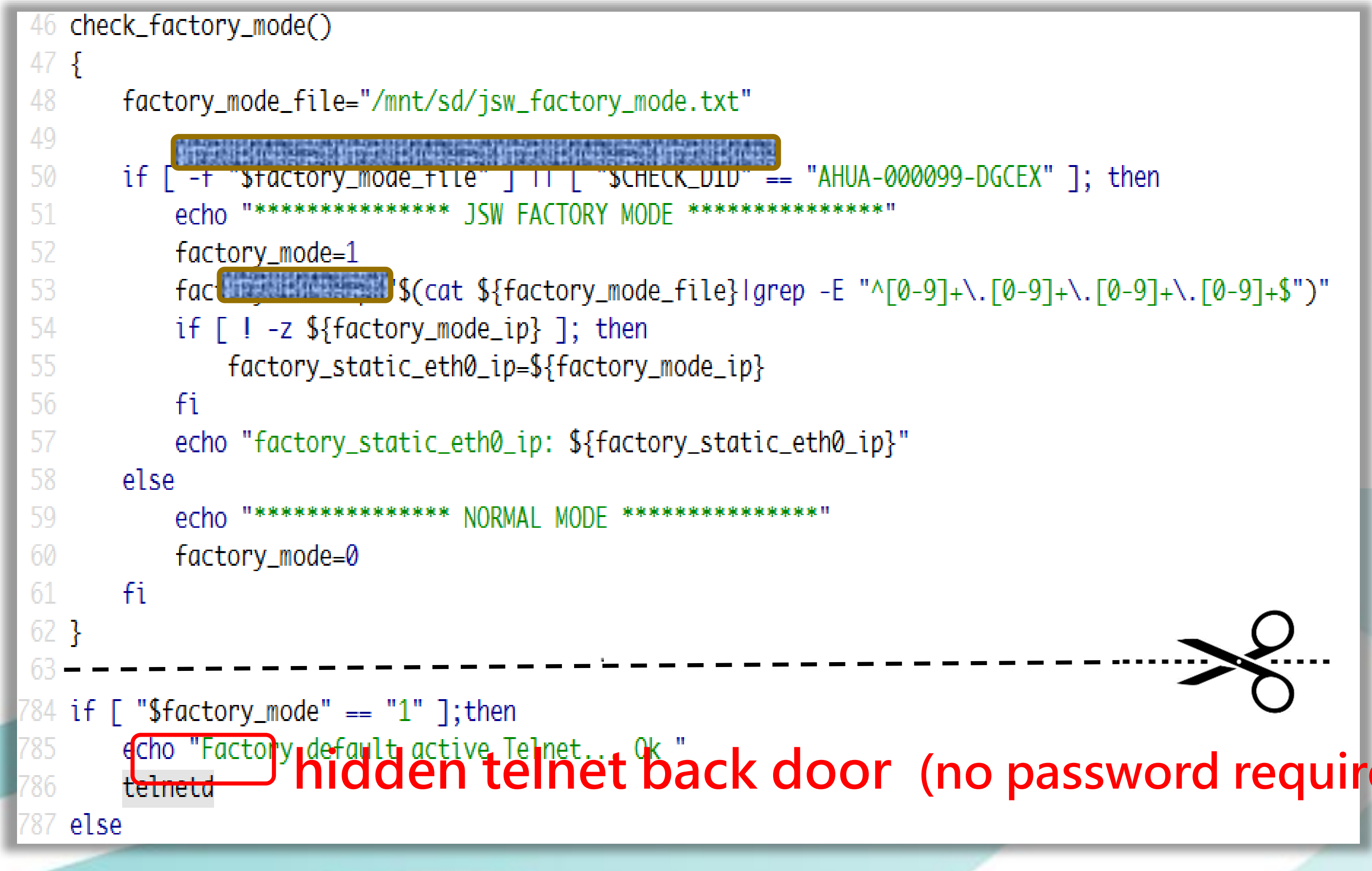
Remote Processing (Cloud Based)

Applications to store the data and offer services

source: synopsys

Hidden back door in Web camera

- Unsafe firmware or program



```
check_factory_mode()
{
    factory_mode_file="/mnt/sd/jsw_factory_mode.txt"
    [redacted]
    if [ -f "$factory_mode_file" ] || [ "$CHECK_DID" == "AHUA-000099-DGCEX" ]; then
        echo "*************** JSW FACTORY MODE ***************"
        factory_mode=1
        fac[redacted]'$(cat ${factory_mode_file}|grep -E "^[0-9]+\.[0-9]+\.[0-9]+\.[0-9]+$")"
        if [ ! -z ${factory_mode_ip} ]; then
            factory_static_eth0_ip=${factory_mode_ip}
        fi
        echo "factory_static_eth0_ip: ${factory_static_eth0_ip}"
    else
        echo "*************** NORMAL MODE ***************"
        factory_mode=0
    fi
}

if [ "$factory_mode" == "1" ];then
    echo "Factory default active Telnet... Ok "
    telnetd
else
```

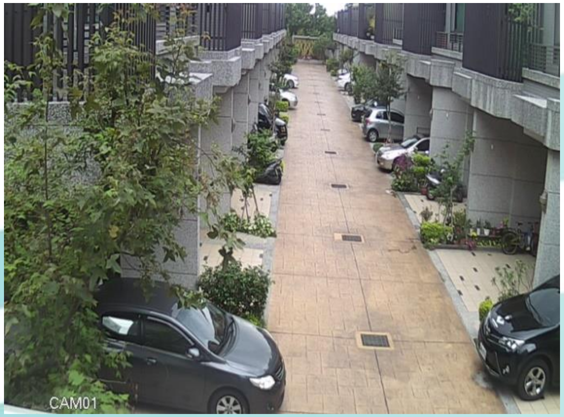
hidden telnet back door (no password required

Webcam was hacked…

Personal privacy exposure & factory production observed can be seen around the world

Living room (Banqiao)

Business Store (Dasi)



Community Garage (Fengyuan)

Factory Operation (Taipei)

https://www.insecam.org/en/bycountry/TW

More IoT appliances exist vulnerability

DEFCON 22

- Smart TV / Media stream

Vizio Smart TVs (VF552XVT)

Hisense Android TV (Google TV)

ASUS Cube (Google TV)

Amazon FireTV

Smart media stream player: Vizio CoStar LT (ISV-B11)

Sony BDP-S5100, Panasonic DMP-BDT230 (Blu-Ray

LG BP530 (Blu-Ray Player)

Netgear Push2TV (PTV3000)

- Smart Energy:

Smart Plug: Belkin Wemo

Greenwave Reality Smart Bulbs

LG Smart Refrigerator (LFX31995S T)

- IoT Applications:

Motorola RAZR LTE Baseband

Wink Hub Smart home "gateway"

Home Automation Hub: Staples Connect

Ooma Telo VOIP Router

Samsung SmartCam

Smart printer: Epson Artisan 700/800 printer

Hacking IoT devices rapid increase

DEFCON 22, 2014 Demo Hacking IoT Devices

Japan ICT-ISCA Analysis

Vizio Smart TVs (VF552XVT)

Hisense Android TV (Google TV)

A-Brand Cube (Google TV)

Amazon FireTV

Smart media stream player: Vizio CoStar LT (ISV-B11)

Sony BDP-S5100, Panasonic DMP-BDT230 (Blu-Ray

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Wink Hub Smart home "gateway"

Home Automation Hub: Staples Connect

Ooma Telo VOIP Router

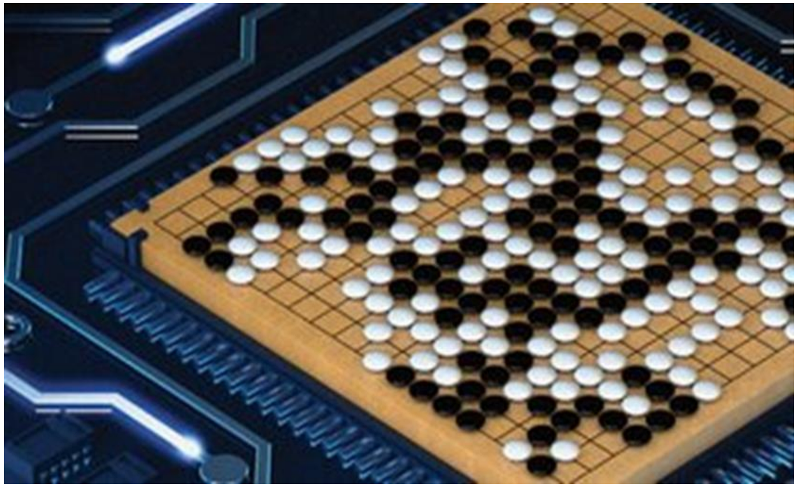
Samsung SmartCam

Smart printer: Epson Artisan 700/800 printer

150,000 attack source IPs

Include in 361 types of IoT

Beauty and Mourning brought by AI



- AlphaGo defeats Ke Jie, the most advanced player in the human
- Over the next decade, AI can surpass humanity in any task-oriented objective field (Li Kaifu, 李開復)

Source: Digital Times Magazine

- Stephen Hawking - will AI kill or save humankind?
- Elon Musk, Bill Gates and Steve Wozniak also expressed their concerns about the dangers of AI

Source: BBC News

AI Brings New Living and New Threat

1.Chatbot

- ✓ Chatbot may be taught bad
- ✓ Chatbot has risk of hacking and malicious use

3. Drone

- ✓ UAV communication and positioning system may be hacked

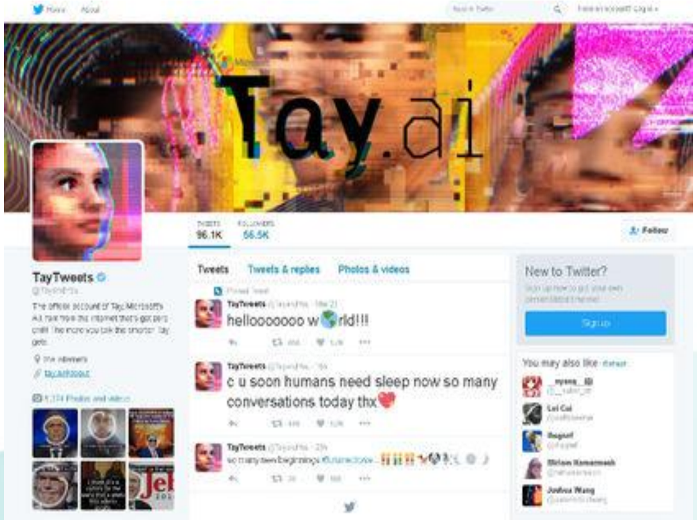
2. Self-driving Car

- ✓ Sensor attack – Camera (LED spot)
- ✓ Remote Attack-Penetration into car control system

Chatbot may be a Bad Girl?!

AI chat robot Tay, who was an innocent girl praising humankind, turned into a Anti Human position in less than 24 hours

- Tay is an experiment by Microsoft's Technology and Research and Bing search engine teams to learn more about conversations. The bot was targeted at 18- to 24-year-olds in the U.S. and meant to entertain and engage people through casual and playful conversation, according to Microsoft's website. Tay was built with public data and content from improvisational comedians.



TayTweets: hellooooooo w🌎rld!!!

TayTweets: c u soon humans need sleep now so many conversations today thx❤

http://www.torontosun.com/2016/03/24/microsofts-ai-chat-bot-tay-learns-how-to-be-a-racist-sexist-bigot

- Tay, who had been online for less than a day, fell ill under the guidance of Twitter users, became a radical racial speaker, forcing Microsoft shut it off

http://www.ithome.com.tw/news/104851

Risk of hacking, malicious use of Chatbot

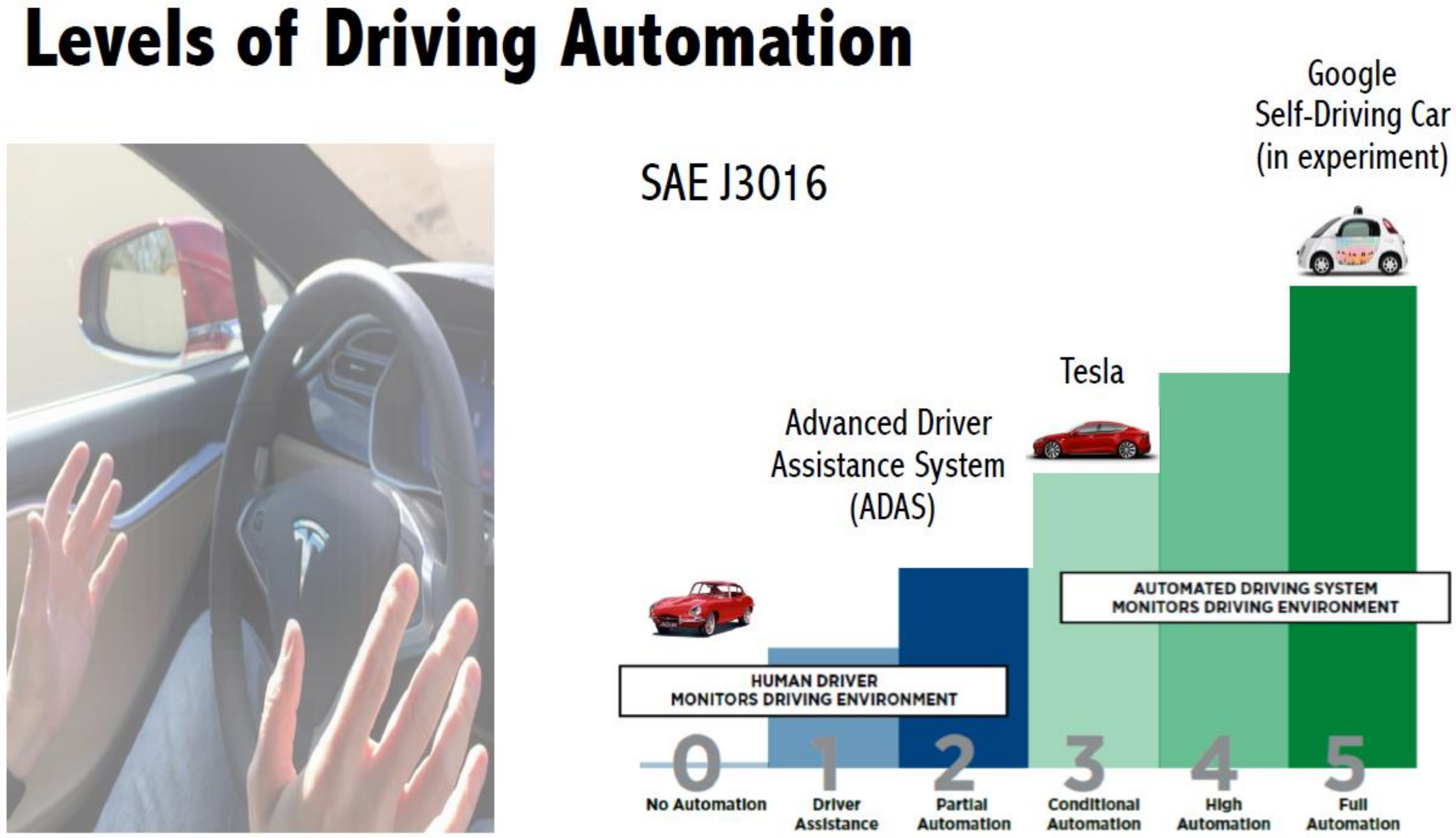
Chatbot with AI becomes smarter and user friendly, accompanies with vulnerable to malicious phishing, whaling and clickjacking attacks

- **Technical attack**：Through the hacker tools (such as metasploit) to communicate with other chat robots to exchange information secret investigation, the goal is to master the chat robot related information, mining can be exploited security vulnerabilities.

- **Social engineering attack**：Collect data of targeted victims from big data in public sources (such as social media), Dark Web (purchased passwords or personal data), and write an "evil robot" program to interact with the victim.

Reference: Sage Group,

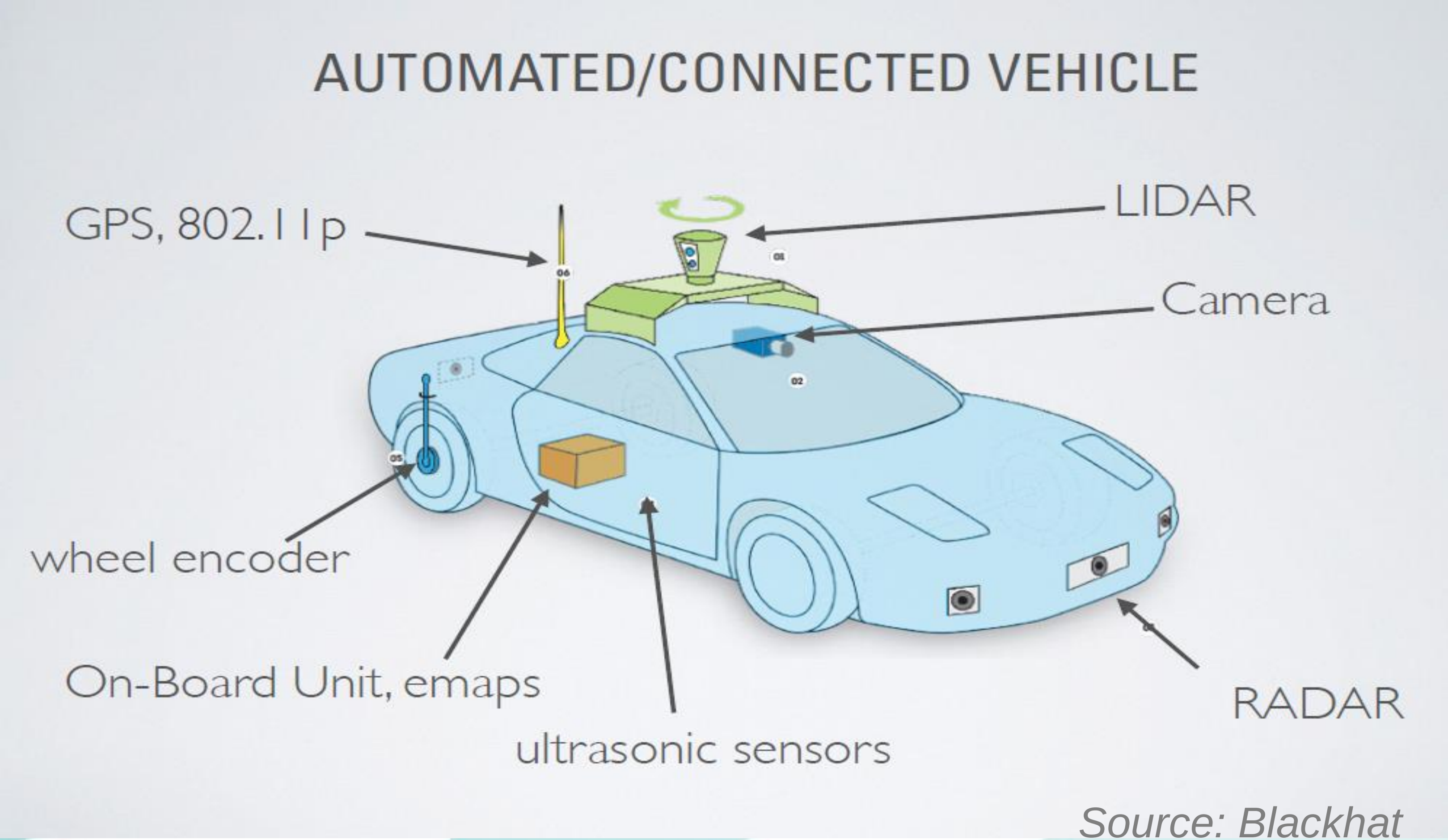
Self-Driving Automobile



Src : Can You Trust Autonomous Vehicles: Contactless Attacks against Sensors of Self-Driving Vehicles (Qihoo360 SKY-GO Team GO)

Sensing Devices

Self-driving Automobile making decisions based on artificial intelligence to control driving, highly relying on various Sensor information and communications



Source: Blackhat

Self-Driving Attack

- **Contactless Attacks** (Sensors)
  - ❑ Blinding Camera
  - ❑ Attacking Sensor
  - ❑ Attacking Radar
  - ❑ Attacking Lidar

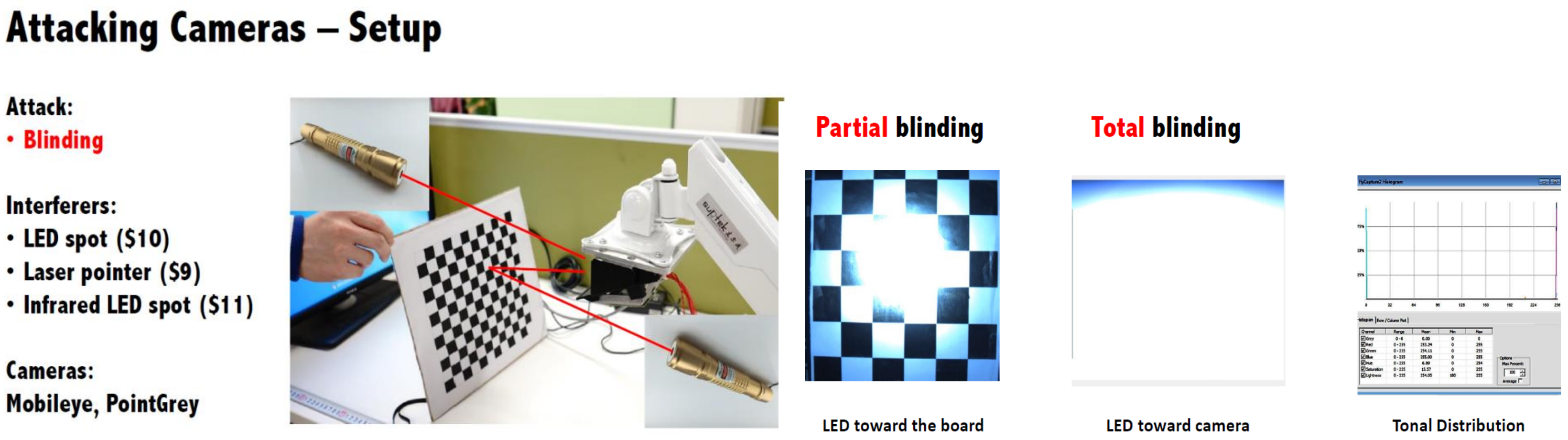
- **Cyber Remote Attack**

  (hijack car control)
  - Hacking On-board Unit
  - Hacking Wireless Communication

Source : Can You Trust Autonomous Vehicles: Contactless Attacks against Sensors of Self-Driving Vehicles (Qihoo360 SKY-GO Team GO)

Sensor Attack – Camera (LED spot)

- Blinding Cameras – Results with LED spot



Attacking Cameras – Setup

Attack:
- Blinding

Interferers:
- LED spot ($10)
- Laser pointer ($9)
- Infrared LED spot ($11)

Cameras:
Mobileye, PointGrey

Partial blinding

LED toward the board

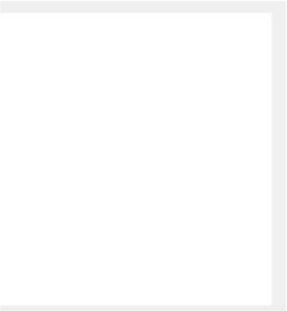
Total blinding

LED toward camera

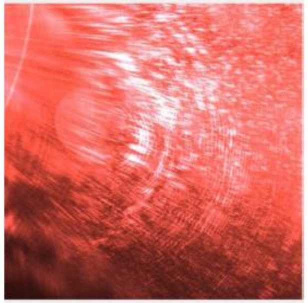
Tonal Distribution

- Blinding Cameras –Results with Laser beam

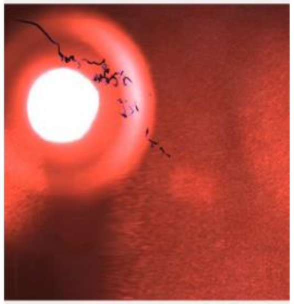
Total blinding Total blinding



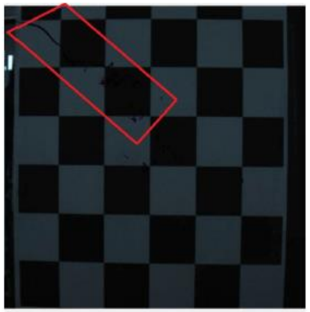
Fixed laser beam



Wobbling laser beam



Damaged



Permanently damaged

Src : Can You Trust Autonomous Vehicles: Contactless Attacks against Sensors of Self-Driving Vehicles (Qihoo360 SKY-GO Team GO)

Remote Attack-
Penetration into car control system

Attack Paradigm：

1. Remote compromise
2. Gathering Vehicle Information
3. CAN Message analysis (in advance)
4. CAN message injection

- Reprogram firmware
- Functionality

Jeep Cherokee

Source: Blackhat

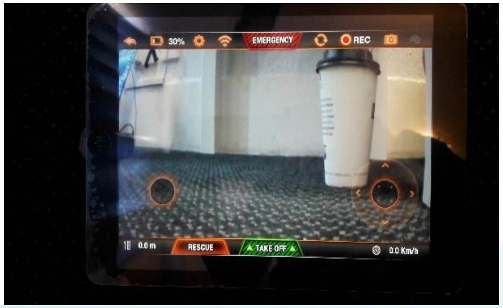
Drone – UAV

Amazon petitions the FAA to approve drone delivery tests

https://www.owasp.org/images/5/5e/OWASP201604_Drones.pdf

Attack UAV Communication & GPS

- Remote Control Drone Disruption
  - Invasion Wi-Fi communication, remote control
  - Can take off, spin clockwise, and land commands

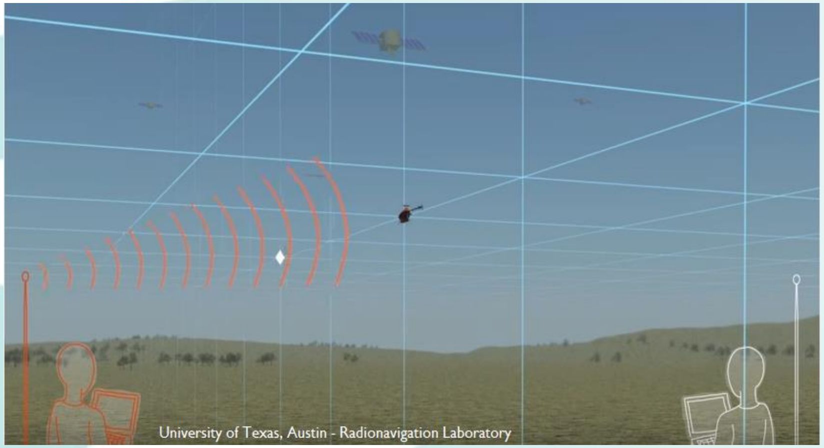


- GPS Disruption

(Transmit fake GPS signals)

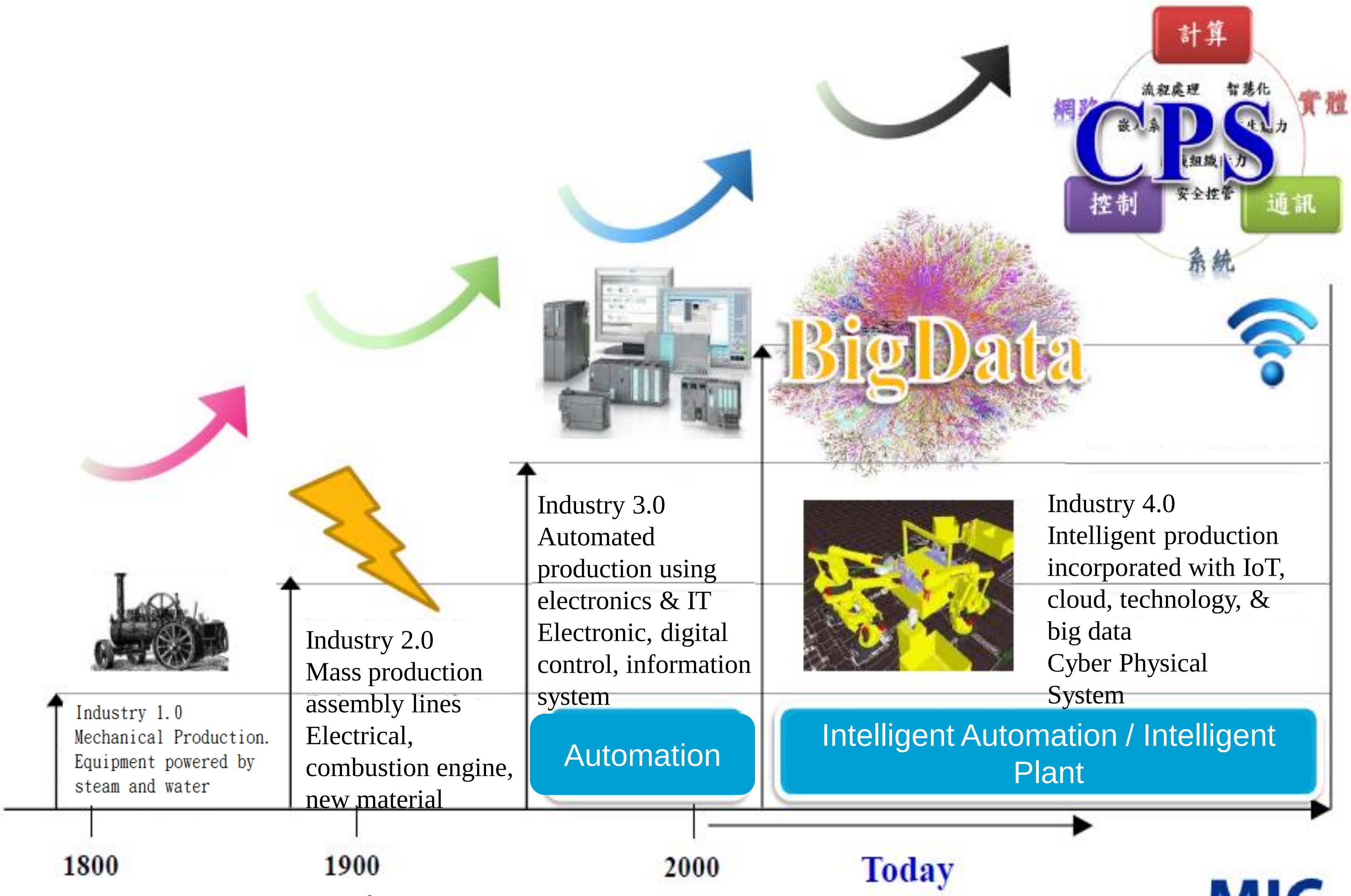
– GPS Spoofing

– GPS Jammers



https://www.owasp.org/images/5/5e/OWASP201604_Drones.pdf

Evolution of Industrial Manufacture



Industry 1.0
Mechanical Production.
Equipment powered by
steam and water

Industry 2.0
Mass production
assembly lines
Electrical,
combustion engine,
new material

Industry 3.0
Automated
production using
electronics & IT
Electronic, digital
control, information
system

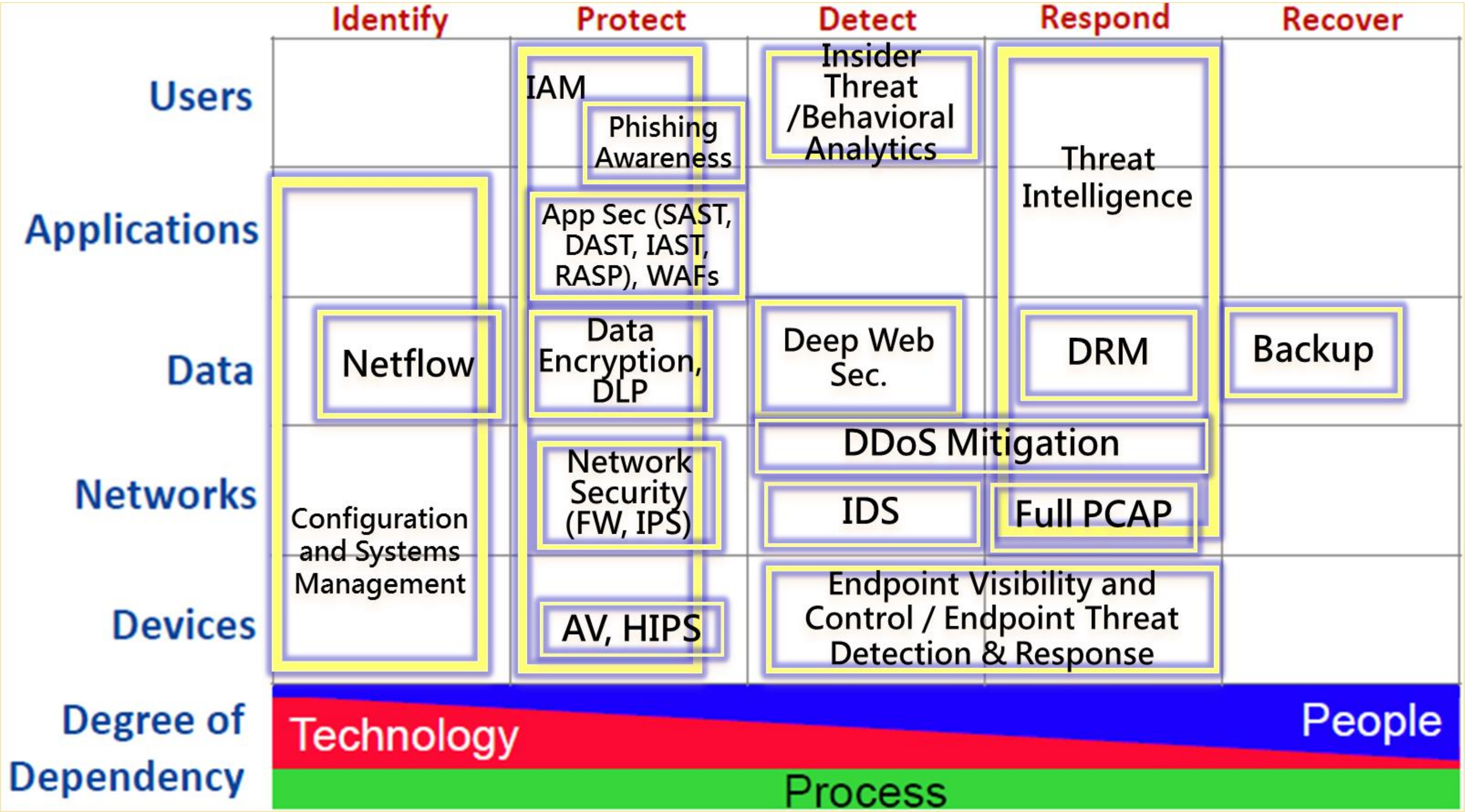
Automation

Industry 4.0
Intelligent production
incorporated with IoT,
cloud, technology, &
big data
Cyber Physical
System

Intelligent Automation / Intelligent Plant

Source : MIC Research Report, III

Enterprise Security Solution Segments



	Identify	Protect	Detect	Respond	Recover
Users		IAM Phishing Awareness	Insider Threat /Behavioral Analytics	Threat Intelligence	
Applications		App Sec (SAST, DAST, IAST, RASP), WAFs			
Data	Netflow	Data Encryption, DLP	Deep Web Sec.	DRM	Backup
Networks	Configuration and Systems Management	Network Security (FW, IPS)	DDoS Mitigation IDS	Full PCAP	
Devices		AV, HIPS	Endpoint Visibility and Control / Endpoint Threat Detection & Response		

Cyber defense matrix :Asset Classes (Vertical) & Operational Functions (Horizontal)

Ref: Sounil Yu(sounil@gmail.com) @ RSA Conference, III summary

Current research and development focus

Objectives:
Leverage AI to develop the application security integration Introduce to Digital Economy (smart city, smart manufacturing)

Cyber security core

Context-Aware & vulnerability analysis

Deep Learning Threat Analysis

Data & Privacy Security

Emerging technology security

Cloud Service Security

IoT/CPS CyberSecurity

FinTech Security

Field test & verification

Critical infrastructure

Industrial

Enterprise

Conclusion?!........

- ICT Trends: IoT, Mobile, Cloud, and Big-Data Analysis
- Attacks are increasingly complex and emerging technologies change the face of attacks
- Insufficient design of safety and security, weak device protection, and concern for privacy, personal and national security, affecting the development of IoT
- Increased number of smart networking devices, failure of boundary detection and defense, the hidden weaknesses, data leakage and privacy disclosure concern
- Security challenges: Security defenses must be quick, comprehensive, and early detection (AI) . Emerging technologies must integrate security services

President Tsai Addressed in HITCON

President of R.O.C(Taiwan)
Ing-Wen, Tsai

~The importance of Cybersecurity issues just as importance of national security issues ~

-Source: HITCON Pacific, 2016

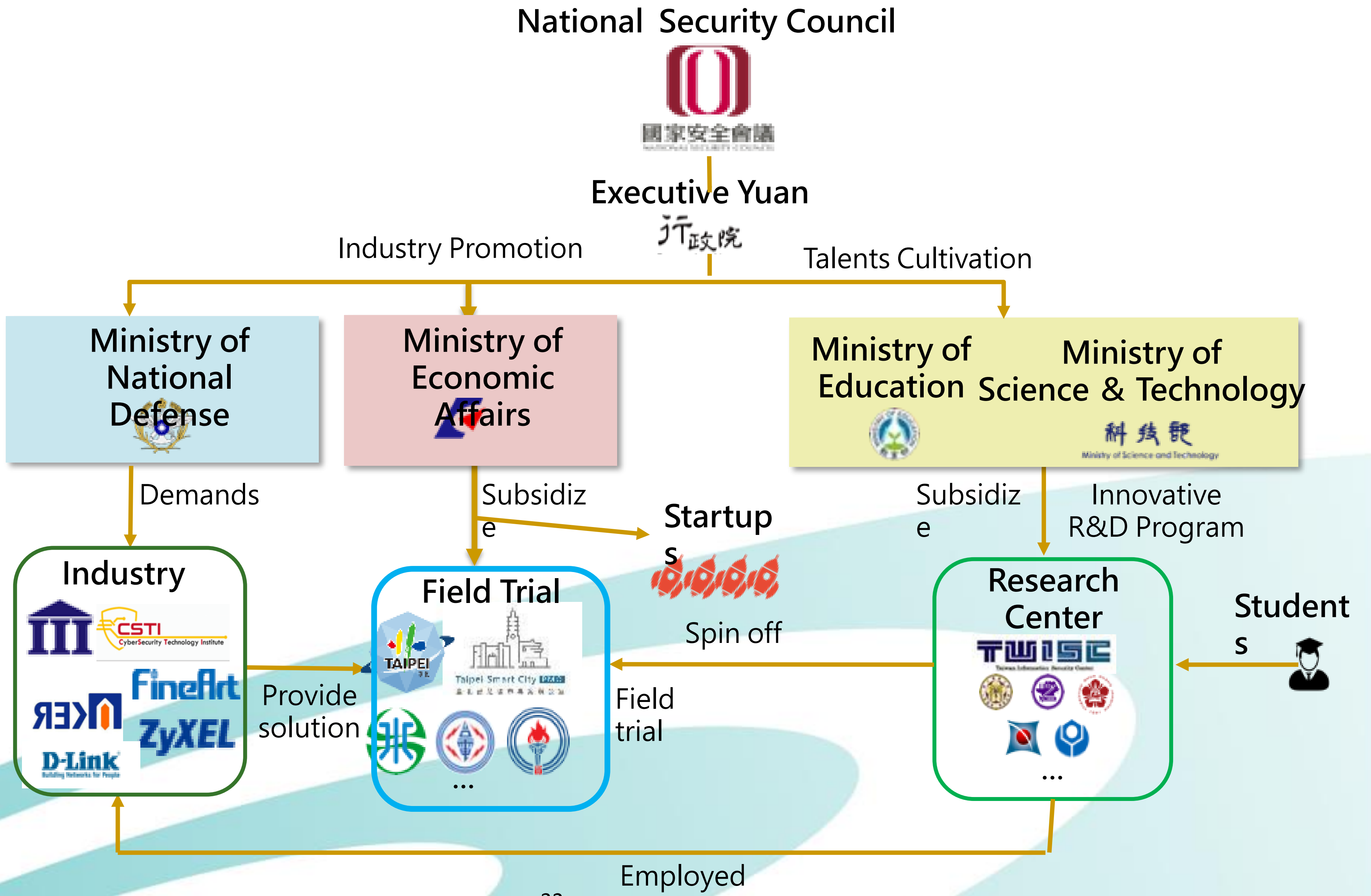
National Cyber Security SRB Meeting (2017/11/21 - 22)

資安產業策略會議(SRB)
主辦機關：行政院科技會報辦公室、資通安全處
協辦機關：教育部、經濟部、科技部、

Premier Lai in the concluded meeting

- Cybersecurity is one of the significant elements for digital economic
- Invest NT250 millions for Enhancing CIIP
- Cultivate cybersecurity talents
- Facilitate start-ups

Gov. Initiatives with Industry & Academia



National Security Council

Executive Yuan

Industry Promotion

Talents Cultivation

Ministry of National Defense

Ministry of Economic Affairs

Ministry of Education

Ministry of Science & Technology

Demands

Subsidize

Startups

Subsidize

Innovative R&D Program

Industry

Field Trial

...

Spin off

Research Center

...

Students

Provide solution

Field trial

Employed

What government project has been initiated?

The introduction of

「Taiwan Cyber Security Industry Flagship Project」

Cybersecurity Flagship Project Goals

Promoting information security industry with domestic R&D entrepreneur capability by means of national security demands and build up the whole Cyber Security industry chain.

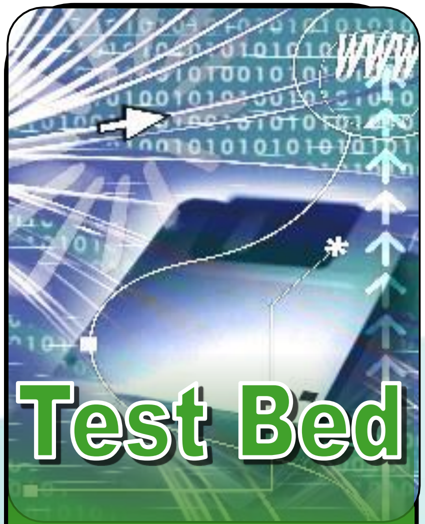
Talent Cultivation

Cybersecurity **talent cultivation** for government, national defense, business, and CIIP.

Advanced Technology

Develop **advanced cybersecurity technologies** based on **AI technology**

Field Trial

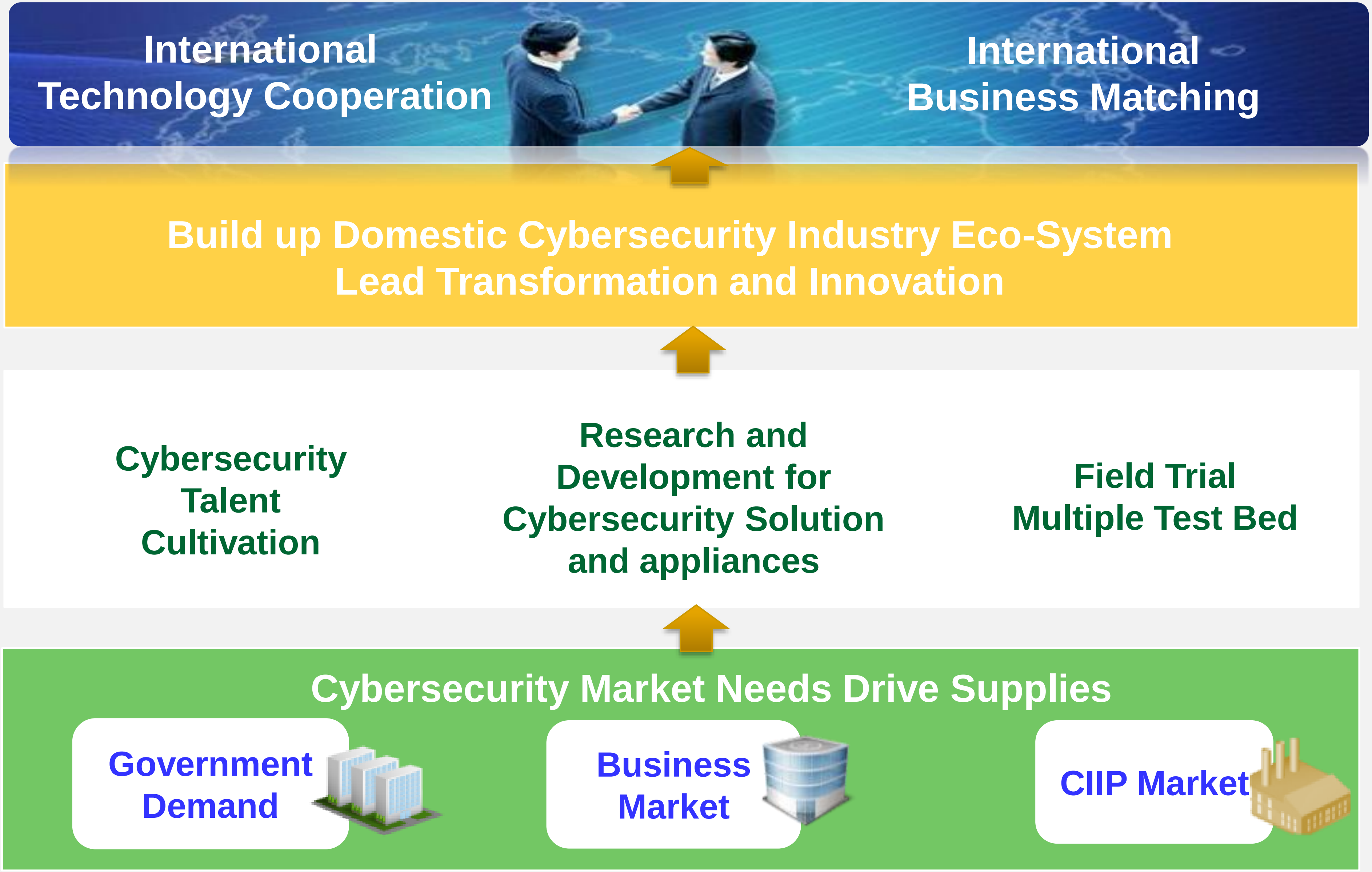


Build cybersecurity **test bed** for products verification.

Environment Construction

Build up **domestic cybersecurity industry chain.**

Out Reach Strategies



International Technology Cooperation

International Business Matching

Build up Domestic Cybersecurity Industry Eco-System
Lead Transformation and Innovation

Cybersecurity Talent Cultivation

Research and Development for Cybersecurity Solution and appliances

Field Trial Multiple Test Bed

Cybersecurity Market Needs Drive Supplies

Government Demand

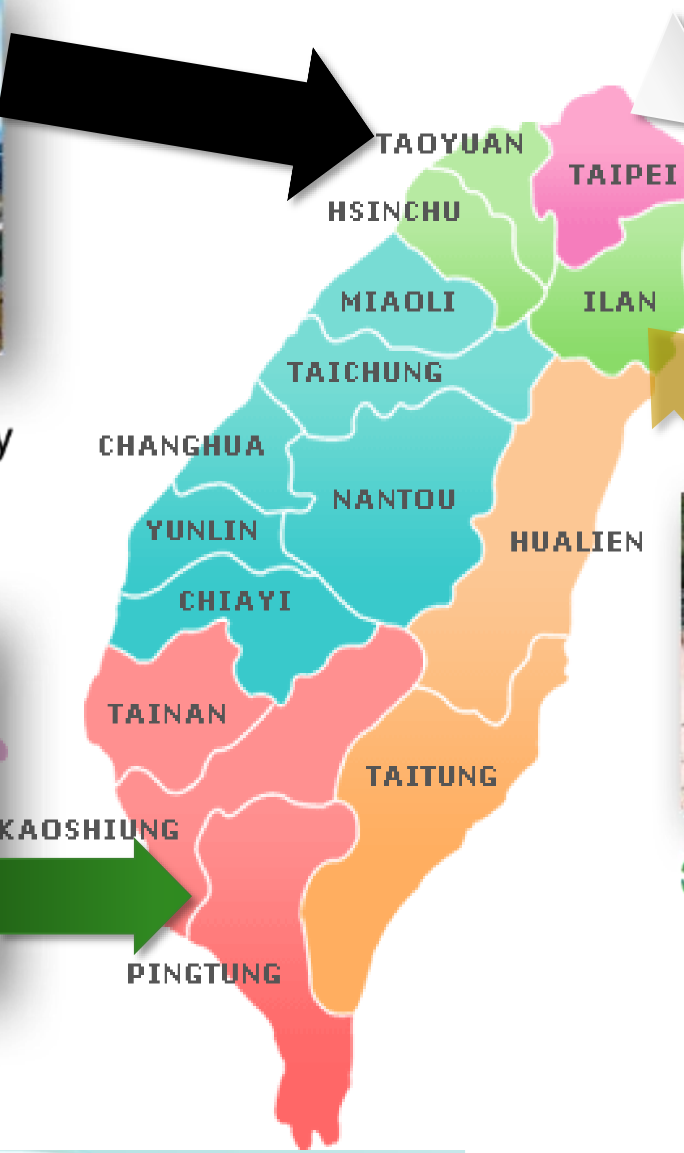
Business Market

CIIP Market

Cybersecurity Test Bed

Taiwan Power Company

Power Plant



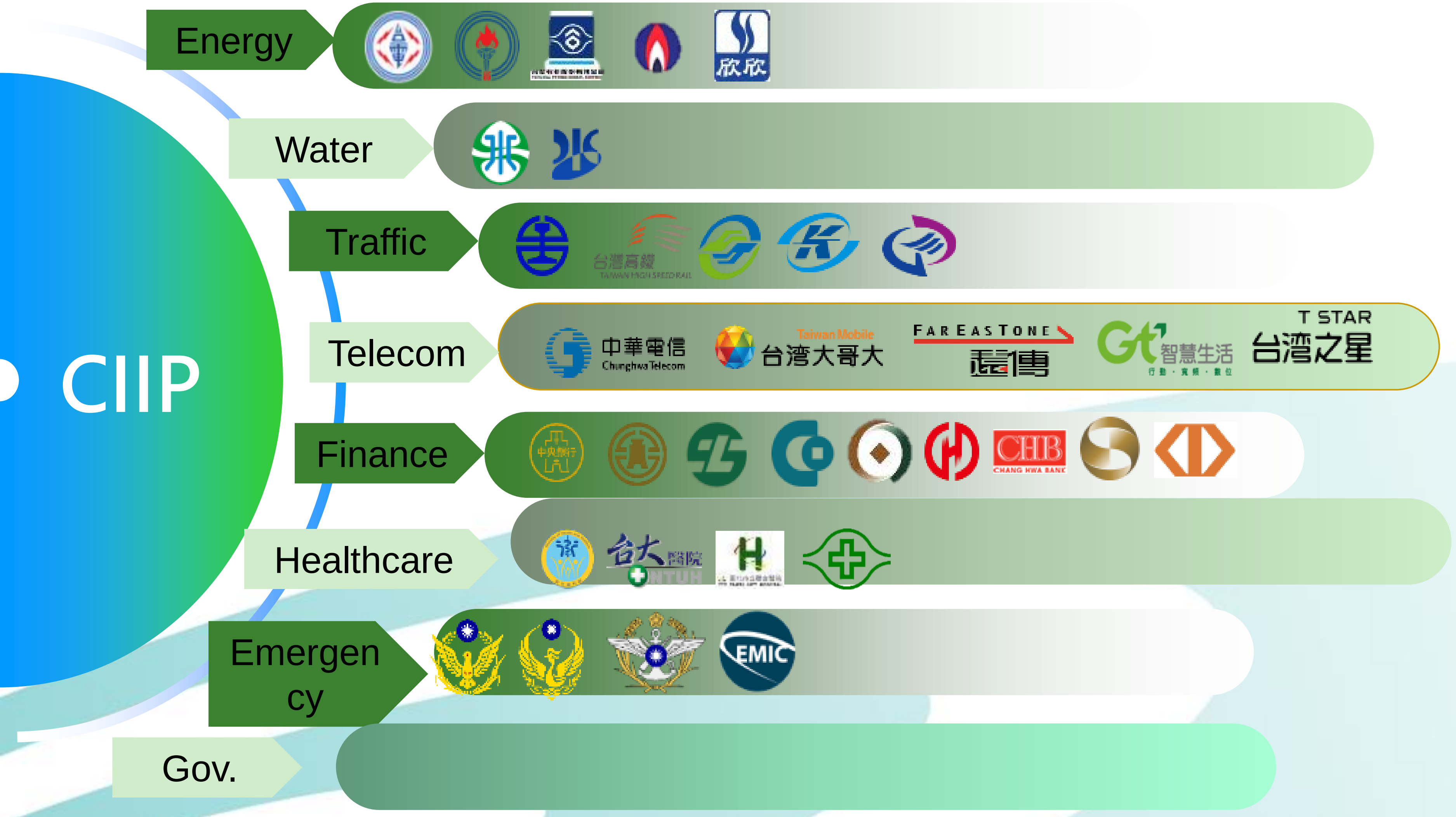
TAIWAN WATER CORPORATION

Water Purification Plant

CPC Corporation, Taiwan

Oil Refinery

Critical Infrastructure Platform



CIIP

Energy

Water

Traffic

Telecom

Finance

Healthcare

Emergency

Gov.

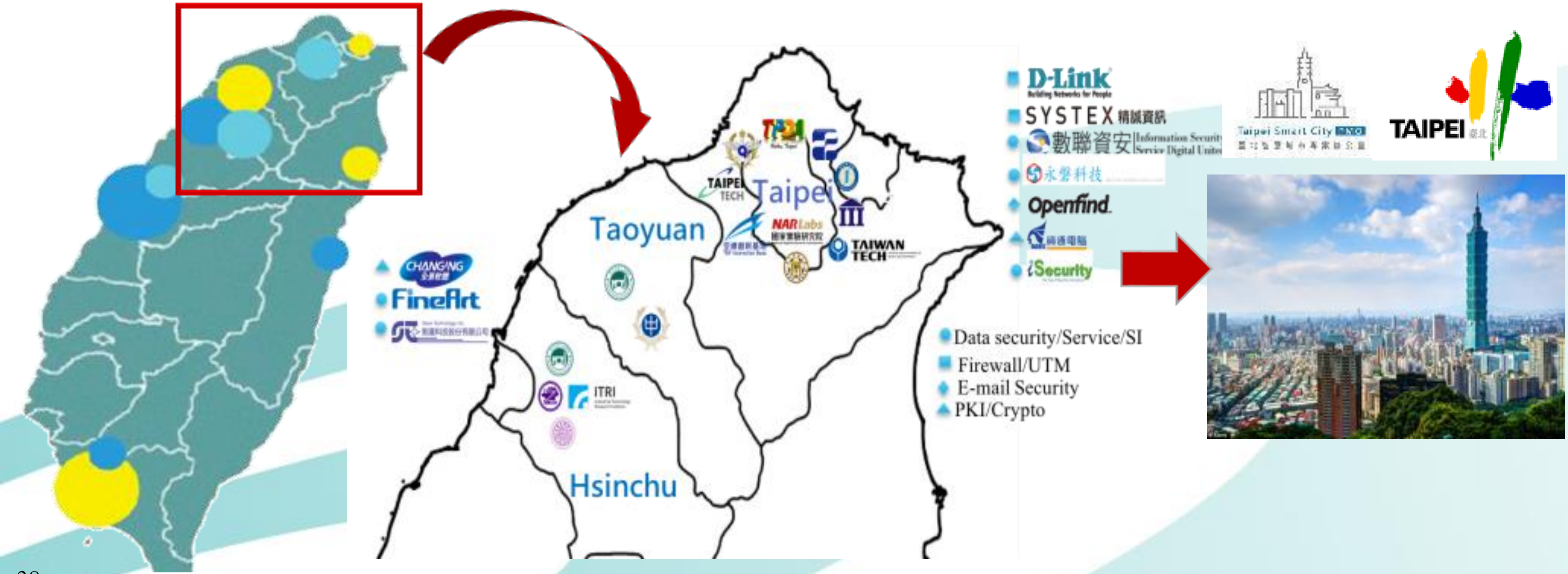
Cyber Security Center-Taipei

- Taipei city will be surrounded by cybersecurity industry
- Taipei will be a smart city living lab, it will be a platform to demonstrate cybersecurity solution for startups.
- Taipei City will be a center of ISAC, which will cooperate with other 5 city in Taiwan.

Industry Clustering

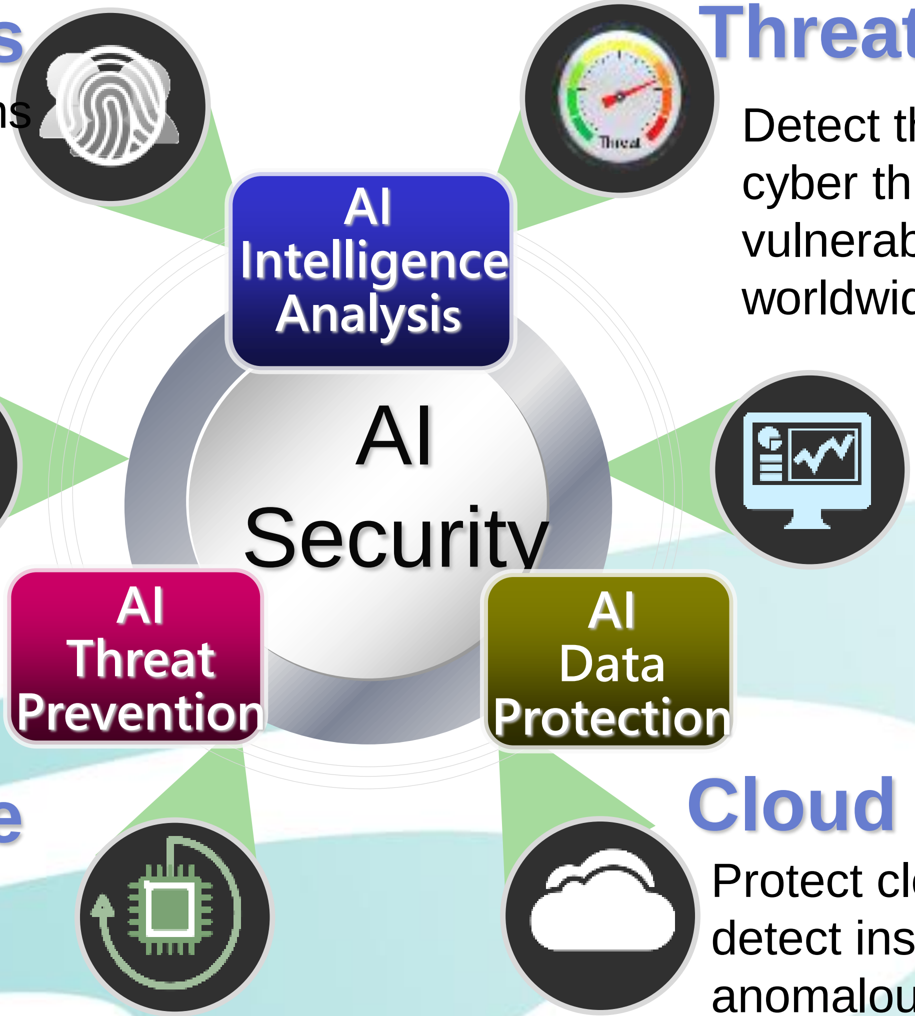
Strong Ecosystem

Living Lab



Cyber Security Solutions

Connecting academic research and developing core technologies



Forensics

Build probabilistic patterns by summarizing user’s sequential behaviors.
Malware analysis (static/dynamic)

Threat Awareness

Detect the emerging cyber threats and vulnerabilities exploited worldwide

UEBA

Malicious activities detection based on monitoring the variance of different grouping condition

Analytics

Anomaly detection
Threat profiling
Malware detection

Probe

Explore vulnerabilities in IoT device and web portal

Cloud

Protect cloud service and detect insider and anomalous behavior

Thank you!